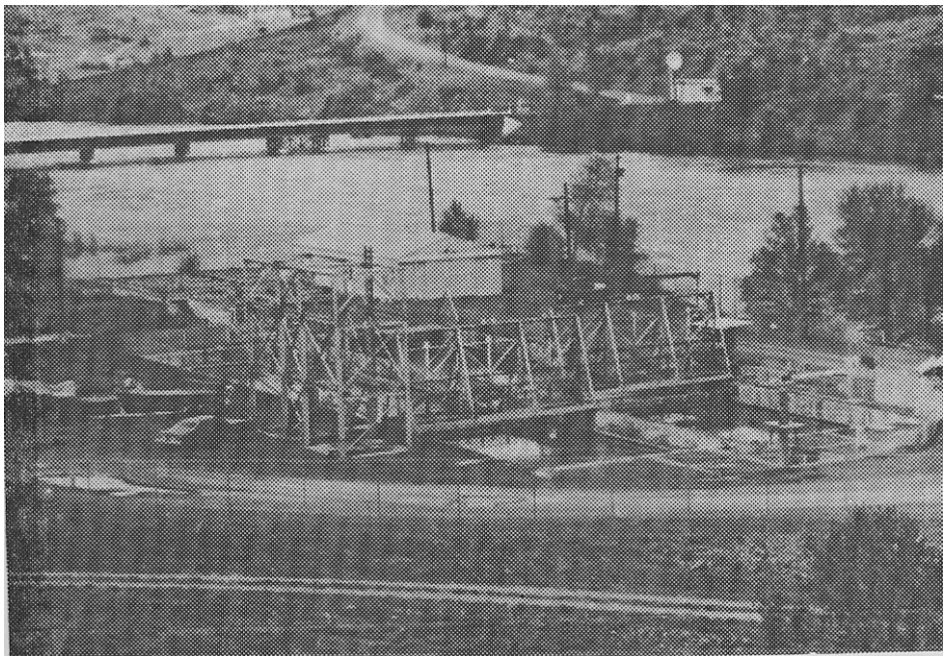
OXBOW FISH HATCHERY

1996 Steelhead Brood Year Report
1995 Spring Chinook Brood Year Report



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ABSTRACT

For brood year 1996, the steelhead trout *Oncorhynchus mykiss* run totaled 1,383 fish entering the Hells Canyon Dam fish trap. Fall trapping (October 30, 1995 to December 06, 1995) collected 1,383 fish. Of these fish, 575 were males and 808 were females. Due to high water, the trap was not operated during the spring.

Age-class breakdown of the run was 905 one-ocean fish and 478 two-ocean fish. Wild fish made up 0.14% (two fish) of the run. There were 144 marked fish collected; 130 left (or right) ventral clipped with coded-wire tags (CWT) and 14 with various other jaw tags, or floy tags.

A total of 439 surplus adult steelhead were released during the fall. Hells Canyon Reservoir received 128, Payette River received 50, Boise River received 259, and 2 were placed in the Morrison-Knudsen Nature Center ponds. Hells Canyon Reservoir received an additional 19 surplus spawners in the spring and six escapes during the winter.

Two fall chinook salmon *O. tshawytscha* were incidentally captured during fall steelhead trapping this year.

Pre-spawning mortality totaled 147 steelhead adults (15.64%). Spawning consisted of 11 egg takes from March 11 until April 15, 1996. A total of 411 females were spawned with an average fecundity of 5,019 eggs per female. These fish produced 2,062,797 green eggs. The percent eye-up was 83.25%, leaving a total of 1,717,366 eyed eggs.

Niagara Springs Hatchery received 520,797 eyed eggs and 783,599 swim up fry. Culled eggs and fry totaled 272,290 eyed eggs and 104,789 surplus fry.

During the spring of 1997, 660,651 steelhead smolts were hauled from Niagara Springs Hatchery and were released below Hells Canyon Dam.

For brood year 1995, spring chinook salmon were trapped from May 15 through July 28, 1995. The run totaled 36 fish; one jack, 20 two-ocean fish, and 15 three-ocean fish. A total of 35 fish (20 males, 14 females, one jack) were transferred to Rapid River Hatchery.

Pre-spawning mortality totaled one salmon trap mortality and 2 mortalities after transfer to Rapid River Hatchery. A total of 13 females were spawned for a total of 49,029 green eggs. Eye-up was 87.3% for 42,802 eyed eggs.

A total of 13,470 spring chinook salmon smolts from Rapid River Hatchery were released during the spring of 1997. These smolts were all marked with an adipose fin clip.

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1996 STEELHEAD BROOD YEAR REPORT

INTRODUCTION

Oxbow Fish Hatchery (OFH) is part of the Idaho Power Company's (IPC) hatchery system and has been in operation since 1962. The OFH facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (Department). The hatchery is located on the Oregon shore of the Snake River at mile marker 270, approximately one-quarter mile below IPC's Oxbow Hydroelectric Plant. The OFH is a steelhead trout *Oncorhynchus mykiss* and spring chinook salmon *O. tshawytscha* adult holding and egg taking station.

OBJECTIVES

The primary purpose of OFH is to trap enough returning adult steelhead and spring chinook to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the upper Snake River. The mitigation goal is to produce 400,000 pounds of steelhead smolts at Niagara Springs Fish Hatchery. The OFH's goal is to produce 1.3 million eyed steelhead trout eggs. The OFH also traps spring chinook that are transferred to Rapid River Fish Hatchery for spawning.

Facility Description

The OFH consists of a main hatchery building, four adult holding ponds, an incubation water chilling unit, an off-station fish trap, and a single-family residence. The facility has six cinder block raceways that have exceeded their usefulness.

The hatchery building is a 28 ft x 60 ft, single-story metal structure partitioned into two main rooms. Half of the building consists of shop space, office space, and sleeping quarters, while the other half is for egg incubation. Two 8-ft square sheds attached to the main building provide storage.

The incubation room has the capacity to eye-up 3.4 million eggs. The 24 incubation stacks provide the hatchery with 384 incubation trays (FAL and Heath trays).

The well water chiller refrigeration unit is enclosed in a 12 ft x 17 ft metal building to the side of the hatchery building. The chiller has the capacity to chill 120 gallons per minute (gpm) of water to 40°F.

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four. The two larger divisions each measure 105 ft x 30 ft x 5 ft, providing 31,500 cubic feet of holding area. The two smaller divisions measure 55 ft x 30 ft x 5 ft, providing 16,500 cubic feet of holding space. Two electric crowding racks provide the ability to consolidate the fish for handling. Six outside raceways (3 ft x 6 ft x 100 ft) could provide 10,800 cubic feet of rearing space after reparations. The adult fish trap consists of an attraction pool, the fish ladder, two weirs, a fish trap, and a loading hopper. The fish are removed from the trap when the loading hopper is hoisted the 80 feet to the fish

transport truck. The fish truck is a 1981 GMC 2.5-ton, 10-wheeled truck with a bed-mounted 1,000-gallon fish tank. Up to 100 fish are then transported the 23 miles to OFH.

Water Supply

The Snake River provides a major portion of the water for hatchery operations. A pumping platform adjacent to the hatchery holds two production pumps. These production pumps (100-hp each) produce 20 cubic feet per second (cfs). Only one pump operates at any given time. The other pump acts as an emergency backup and has a separate power source. Water temperatures range from a winter low of 34°F to a late summer high of 72°F. Water from the production pumps passes through two aeration pump platforms before entering the four holding ponds.

Two wells provide the water for steelhead trout egg incubation. One well acts as a primary water source, while the other is an emergency backup with a separate power source. The primary well water was a constant 52°F, while the backup was a constant 54°F. Both wells pump a maximum of 120 gallons per minute. Incubation water enters an elevated surge tank in the hatchery building before distribution through two 4-inch PVC water lines to the 24 incubator stacks.

Staffing

The OFH is staffed by one permanent Fish Hatchery Assistant Manager. Two temporary Bio-aides and two laborer positions share the 2,400 hours budgeted for extra help.

Adult Collection

Fall trapping for steelhead trout started on October 30 and ended December 06, 1995 capturing a total of 1,383 steelhead (Appendix J). The trap was not started during the spring due to high water flows. The 1996 brood year steelhead run of 1,383 fish comprised 808 females and 575 males. The broodstock strategy of 1,200 fish, one fourth of the egg take being from spring-run fish was not met this year.

All trapped steelhead trout were measured for fork length to the nearest centimeter. This procedure allowed for the age-class designation of one-ocean steelhead being the male fish less than 68 cm and those female fish less than 65 cm. Using this criterion, 905 steelhead (453 males, 452 females) were one-ocean fish, and 478 steelhead (122 males, 356 females) were two-ocean fish (Appendix K).

Adult fish releases during the fall totaled 439 surplus adults (182 males, 257 females) for additional fishing opportunities. A total of 128 were released into Hells Canyon Reservoir at OFH during the fall of 1995. There were 259 fish transported and released into the Boise River, 50 into Payette River and 2 into the Morrison-Knudsen Nature Center ponds this fall. An additional 19 surplus spawners were released into Hells Canyon Reservoir during the spring, and six fish escaped into the reservoir during the winter (11 males, 14 females).

Tag Recovery

This season, 144 steelhead trout were captured with some form of mark or tag. There were 130 fish with a left (or right) ventral fin clip, and 14 others with various combinations of jaw tags, and floy tags. There were 2 jaw tags, 12 fish with floy tags. The tagging agencies included the National Marine Fisheries Service, the University of Idaho, the Washington Department of Fisheries, the Oregon Department of Fish and Wildlife, and the Idaho Department of Fish and Game. The snouts of 108 of the ventral fin-clipped fish were shipped along with all jaw and floy tags to the Lewiston Tag Recovery Laboratory. Twenty-two ventral (V) fin-clipped fish were in the group of released fish.

Of the 1,383 steelhead captured two were wild or natural fish (0.14%). Wild or natural steelhead were identified by having an adipose fin (AD) and the remaining fins not eroded. These fish were returned to the Snake River downstream of the Hells Canyon Dam.

Incidental Capture of Fish

The fall trapping effort for steelhead resulted in the capture of two fall chinook salmon. One had no fin clips and measured 65 cm fork length. The other had an AD clip and measured 41 cm. Both were returned to the Snake River downstream of the Hells Canyon Dam and were not recaptured.

Holding and Spawning

Pre-spawning Mortality

Pre-spawning mortality consisted of all female steelhead that died prior to spawning and those male steelhead that died up to two weeks after the first spawning date (March 25, 1996). Pre-spawning mortality was 147 fish (15.64%) out of the 940 that were ponded and comprised 67 males and 80 females.

Spawning Operations

Steelhead trout spawning operations began on March 11 and ended on April 15, 1996. Females were sorted twice weekly for ripeness. Ripe females were killed with a blow to their head. Females were dry-spawned by incision, and the eggs were collected in a colander to drain the ovarian fluid. Eggs from each female were placed into a spawning bucket, then fertilized with sperm from one male. The fertilized eggs from two females were poured together and remained in one cup of well water for up to five minutes to activate sperm. The fertilized eggs were water-hardened in a minimum of 100 ppm buffered Argentyne for one hour. Ovarian fluid samples were collected from 150 spawned female for viral assay. The eggs were loaded into the incubator trays with two families per tray, maintaining the integrity of the disease samples.

Twenty-two female steelhead trout were killed for spawning, but their eggs were culled due to abnormal appearance of eggs or internal organs.

Incubation

Eleven egg takes produced 2,062,797 green eggs from 411 females for a fecundity of 5,019 eggs per female (Appendix G). The percent eye-up was 83.25% for 1,717,366 eyed eggs. Egg numbers were determined by enumeration of eyed eggs with a Jensorter brand Model JH egg sorter with electronic counter.

After the first two days of incubation, daily 15-minute drip treatments of 1,667 ppm formalin were used to prevent fungus. Incubator water flows were 5 gpm. Eggs eyed-up after 350 temperature units in the 40°F well water. Eyed eggs were shocked by pouring a tray of eggs into a bucket half-full of water and pouring them back into the egg tray.

Egg Shipments

Eyed eggs were sent only to Niagara Springs Hatchery this year. Half of Niagara's production fish were shipped as eggs (520,797) from the last six lots. The first two egg takes were excess and were culled after all shipments were off station. The eggs were transported in 48-quart coolers with iced well water.

Fry Shipments

A total of 783,599 swim up fry were transported to Niagara Springs Hatchery during July. These were reared in chilled 44°F water to delay their shipping. These fry were left in their screen incubation trays for transport. Three or four trays were banded together with an empty tray on top to keep the fry under water. These stacks were then floated in a two-ton fish truck filled with chilled water, and were transported to Niagara Springs. These fry came from the third, fourth, and fifth egg takes (Appendix H).

Carcass Disposition

Hatchery employees checked all carcasses for clips, tags, signs of bacteria, and other diseases. The fish carcasses were taken to the Halfway Landfill for burial.

Steelhead Smolt Releases

The 1996 brood year steelhead trout smolts were released in the spring of 1997. A total of 660,651 steelhead smolts averaging 4.97 per pound (132,870 pounds) were released into the Snake River below Hells Canyon Dam. Niagara Springs Hatchery reared these smolts. For more information, see Niagara Springs Hatchery annual report.

1995 SPRING CHINOOK BROOD YEAR REPORT

SPRING CHINOOK TRAPPING

Spring chinook salmon returning to the Hells Canyon trap in 1995 were from smolt releases in 1992, 1993, and 1994 (Appendix I).

Spring chinook salmon trapping began May 15, 1995 and ended July 28, 1995 (Appendix L). The trap was operated 24 hours a day with the fish being collected and hauled to the hatchery every morning. A total of 36 salmon were trapped, one jack, 21 males and 14 females. The Hells Canyon salmon run comprised one one-ocean fish, 20 two-ocean fish, and 15 three-ocean fish. A fork length of $\leq$53 cm denoted one-ocean fish, 54-80 cm defined two-ocean fish, and $\geq$81 cm designated three-ocean fish (Appendix M).

Holding And Spawning

Adult Treatments

Erythromycin 100 injections were given while these fish were at OFH according to the INAD protocol. The chinook were injected at one dosage rate; the fish received the high dosage rate of 20 mg/kg. All fish were marked with a round plastic tag stapled to their opercle. The tag number and the fish's length, marks etc. were then entered in an ANADFISH computer program. A total of 36 spring chinook salmon trapped in 1995. There was one trapping mortality, and the remaining 35 chinook were transported to Rapid River Hatchery (34 adults, one jack). These fish were hauled at the end of each week. Adding 44 blocks of ice chilled the water in the transport truck. In addition, 33 grams of MS222 was added to the water to reduce fish stress during transport.

Pre-spawning Mortality

Pre-spawning mortality for 1995 spring chinook was three fish. One salmon died in the trap and two salmon (one male, one female) after transfer to Rapid River Hatchery. The majority of the mortality was attributed to fungus.

Spawning Operations

The Hells Canyon trapped fish were combined with Rapid River's broodstock this year. All numbers are a percentage of the total from Rapid River Hatchery. A total of 13 female Hells Canyon chinook salmon were spawned, producing 49,029 green eggs. The percent eye-up was 87.3%, leaving 42,802 eyed eggs.

Chinook Smolt Releases

Brood year 1995 spring chinook salmon releases were conducted in the spring of 1997. These smolts were reared at Rapid River Hatchery. A total of 13,470 smolts were released into

the Snake River below Hells Canyon Dam. All of these smolts were marked prior to their release. They were fin-clipped with an AD removed. See Rapid River Hatchery's annual report for more information.

HATCHERY IMPROVEMENTS

Idaho Power's Oxbow maintenance personnel were responsible for the work related to many hatchery improvements. The major improvements included:

- fabrication of visitor information signs.
- alteration of the fish trap to eliminate stranding fish in the hopper holding area
- installation of safety fencing and grating around various hazards
- upgrade crowding system and install walkways in holding ponds to improve employee safety

A major purchase for OFH was a chilling unit for the incubation water system. Its installation will enable the hatchery to adjust the development rate of eggs. Slowing down the egg development will delay feeding and will help ensure the correct size at release without holding the fingerling off feed at final rearing facilities.

Another purchase consisted of 12 eight-tray FAL incubator stacks to replace some of the old stacks. Other purchases included a Micron Millennia personal computer with an HP Laser Jet 5L printer and the requisite software, an Amana microwave for the dorm, and a Hoshizaki ice maker for adult and egg shipments.

HATCHERY RECOMMENDATIONS

The holding ponds need to be modified to create a better holding environment and to reduce fish stress and injuries during routine handling. Efforts should also be made to improve the water quality entering the holding ponds.

Another priority should be the renovation of the hatchery building. The incubation room needs waterproof paneling, adequate lighting, a heat source, and additional electrical outlets. The office space needs to be enlarged and arranged to provide a view of the fish holding ponds for fish monitoring and visitor safety. The dormitory needs major renovation, as it currently is inadequate for temporary employee housing.

The hatchery alarm system should be modified to directly sense the holding pond water level and to be able to register more than one alarm signal at any given time.

APPENDICES

Appendix A. Run timing of steelhead trapped at Hells Canyon, fall 1995.

Month/ Date Trapped	Number of Fish
October 30	264
31	207
November 1	196
02	146
03	23
06	71
07	88
08	36
13	43
14	78
15	32
20	26
21	36
22	29
27	14
28	37
29	31
December 04	6
05	13
06	7
Total	**1383**

Appendix B. Fork length-frequency of steelhead, 1996.

cm	Males	Females	Totals	Inches
49	1	0	1	19.3
50	8	1	9	19.7
51	9	3	12	20.1
52	10	5	15	20.5
53	11	13	24	20.9
54	21	22	43	21.3
55	27	53	80	21.7
56	38	63	101	22
57	45	69	114	22.4
58	58	52	110	22.8
59	50	49	99	23.2
60	51	41	92	23.6
61	44	22	66	24
62	29	16	45	24.4
63	12	24	36	24.8
64	18	19	37	25.2
65	7	29	36	25.6
66	9	40	49	26
67	5	34	39	26.4
68	18	45	63	26.8
69	14	48	62	27.2
70	11	46	57	27.6
71	10	40	50	28
72	18	29	47	28.3
73	14	16	30	28.7
74	10	7	17	29.1
75	10	12	22	29.5
76	9	6	15	29.9
77	1	2	3	30.3
78	2	1	3	30.7
79	2	0	2	31.1
80	2	1	3	31.5
81	1		1	31.9
Total	**575**	**808**	**1383**	

Age Class	Male	Female	Total	Avg Len
One-ocean	453	452	905	58.04
Two Ocean	122	356	478	70.02
Total	**575**	**808**	**1383**	**62.18**

*Age-Class Breakdown:
One-Ocean (males <68 cm, females <65 cm)
Two-Ocean (males ≥68 cm, females ≥65 cm)

Appendix C. Fork length-frequency of spring chinook 1995.

Fork Length (cm)	3--Y-Olds	4-Y-Olds	5-Y-Olds	Total
45				
46	1			1
47				
60				
61				
62				
63		1		1
64				
65		1		1
66		1		1
67				
70		1		1
71		1		1
72		3		3
73				
74		3		3
75		1		1
76		3		3
77		2		2
78		1		1
79		1		1
80		1		1
81			3	3
82			3	3
83			1	1
84				
85			2	2
86			2	2
87				
88			1	1
89				
90			1	1
91			1	1
92				
93				
94				
95				
96			1	1
97				
Total	**1**	**20**	**15**	**36**
Avg Len (cm)	46.0	69.2	85.2	75.5

*age-class Breakdown:
One Ocean (3-yr-olds, ≤53cm)
Two Ocean (4-yr-olds, 54-80cm)
Three Ocean (5-yr-olds, ≥81cm)

Appendix D. Spring chinook run timing at Oxbow Fish Hatchery, 1995.

Month/Date Trapped	Number of Fish	Month/Date Trapped	Number of Fish
MAY 15	0	JULY 07	0
16	0	08	1
17	1	09	0
MAY 18-28	0	10	1
JUNE 19	0	11	0
20	11	12	0
21	2	13	1
22	1	14	0
23	1	15	1
24	2	16	0
25	0	17	0
26	0	18	0
27	2	19	0
28	1	20	0
29	0	21	1
30	0	22	1
JULY 01	1	23	2
02	1	24	2
03	1	25	0
04	0	26	0
05	0	27	0
06	2	**Total**	**36**

Appendix E. Oxbow Fish Hatchery, fish trapping summary and breakdown.

STEELHEAD BROOD YEAR 1996

Fish Trapped	
Males	575
Females	808
Total	**1,383**

Age Class Breakdown *	
One-ocean	905
Two-ocean	478
Total	**1,38**

Fish Disposition	Males	Females	Total
Pre-spawn Mortality	67	80	147
Trapping Mortality	2	2	4
Spawned only	294	411	705
Given to Clearsprings	16	25	41
Released *	196	268	464
Killed but not used	0	22	22
Total	**575**	**808**	**1,383**

* 1 to 1 spawning ratio, all males were spawned at least twice before being released.
Release # includes 439 fall releases, 19 spring releases and 6 escapees into HC Res.

Carcass Disposition	Males	Females	Total
Buried	**363**	**515**	**878**

* Age-Class Breakdown: One-ocean (males <68 cm, females <66 cm)
Two-ocean (males >68 cm, females >66 cm)

SPRING CHINOOK SALMON BROOD YEAR 1995

Fish Trapped	
Jacks	1
Males	21
Females	14
Total	**36**

Age Class Breakdown **	
One-ocean	1
Two-ocean	20
Three-ocean	15
Total	**36**

Fish Disposition	Males	Females	**Total**
Pre-spawn Mortality	1	0	**1**
Shipped to Rapid River	21	14	**35**

All pre-spawn mortalities were buried

** Age-Class Breakdown: One-ocean (3-yr-olds, ≤53cm)
Two-ocean (4-yr-olds, 54-80 cm)
Three-ocean (5-yr-olds, ≥81cm)

Appendix F. Snake River historic releases and return data.

Year	Chinook Released	Steelhead Spring	Released Fall	Chinook Returns	Steelhead Returns
1966			29,400		
1967		587,513			1,681
1968		342,114			1,609
1969		109,200	757,500	344	1,122
1970		385,900	670,960		136
1971			215,625		279
1972			630,900	3	650
1973				2	435
1974				1	125
1975			40,977	14	34
1976			85,510		224
1977		126,000	301,644		243
1978			344,944		186
1979			548,987	1	36
1980		348,520	191,900		339
1981	1,003,200	614,160			158
1982		354,150			203
1983	250,020	92,750	220,270	16	872
1984	500,850	458,917	630,500	3	1,116
1985	437,360	414,712	387,353	699	1,343
1986	140,000	819,495	39,995	395	2,438
1987	547,700	800,000	672,235	543	3,209
1988	400,600	877,400	75,814	458	2,524
1989	500,000	735,500	603,000	84	2,729
1990	551,200	947,200	351,400	30	2,728
1991	500,500	912,000		22	1,151
1992	500,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403
1995	499,986	614,560		36	1,597
1996	67,818	630,152		78	1,383
1997	13,470	660,651		944	1,270
1998	304,096	653,276		74	2,407

Appendix G. Summary of steelhead spawning at Oxbow Fish Hatchery, 1996.

Lot No.	Spawn Date	No. Female	Green Eggs	Eyed Eggs	% Eye-up	Eggs/Females
1	3/11/96	59	280,701	214,145	76.29	4,758
2	3/14/96	13	69,652	61,036	87.63	5,358
3	3/18/96	18	93,657	77,095	82.32	5,203
4	3/21/96	29	146,823	125,843	85.71	5,063
5	3/25/96	72	361,070	323,046	89.47	5,015
6	3/28/96	57	311,541	249,571	80.11	5,466
7	4/1/96	71	354,229	298,926	84.39	4,989
8	4/4/96	20	98,549	84,161	85.4	4,927
9	4/8/96	39	203,828	170,034	83.42	5,226
10	4/11/96	24	106,892	85,533	80.02	4,454
11	4/15/96	9	35,856	27,976	78.02	3,984
	Total	**411**	**2,062,797**	**1,717,366**	**83.25**	**5,019**

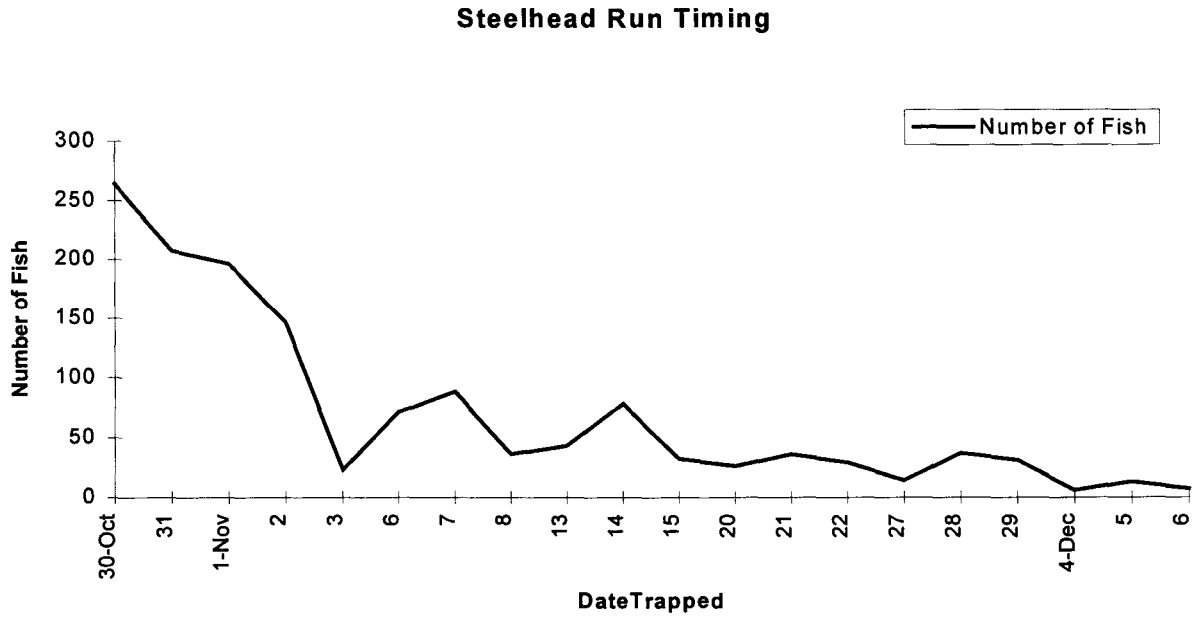
Appendix H. Disposition of Oxbow steelhead eggs, 1996.

2,062,797	green eggs
345,431	pick off - eggs
1,717,366	eyed eggs
272,290	culled eggs
520,797	eyed eggs shipped to Niagara Springs
35,891	pick off - fry
104,789	culled fry
783,599	swim up fry shipped to Niagara Springs

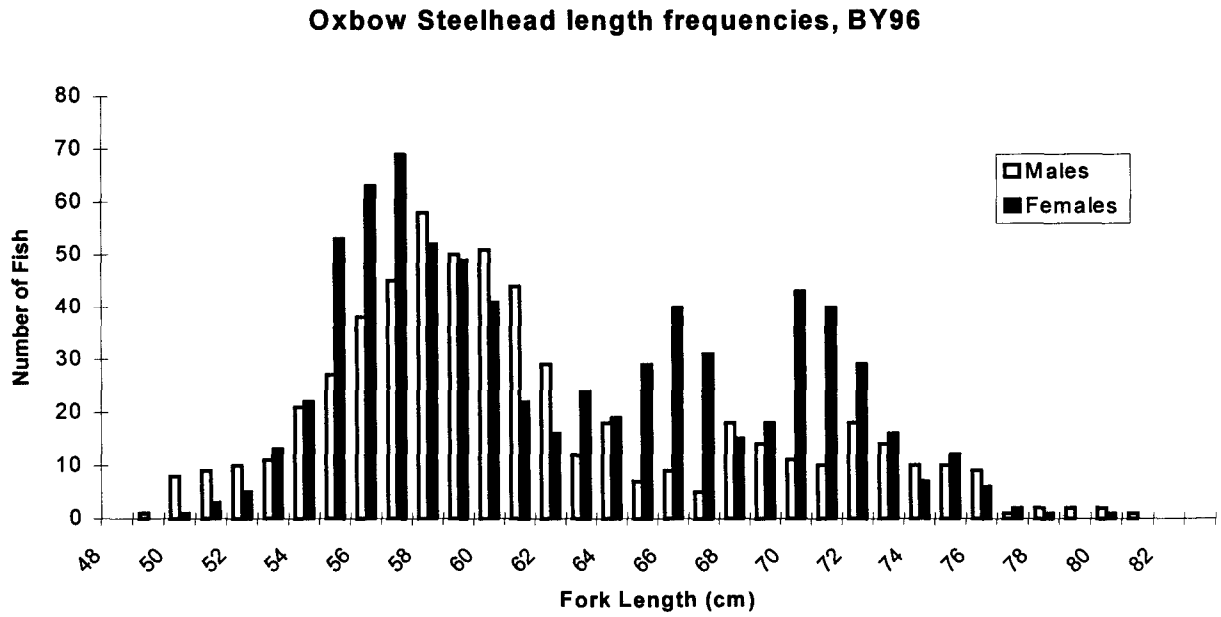
Appendix I. Spring chinook releases and returns, BY95.

Release Year	Smolts Released	1995 Returns by Release Year	Previous Returns
1992	500,500	15	11
1993	200,300	20	1
1994	380,504	1	0
Totals	**1,081,304**	**36**	**12**

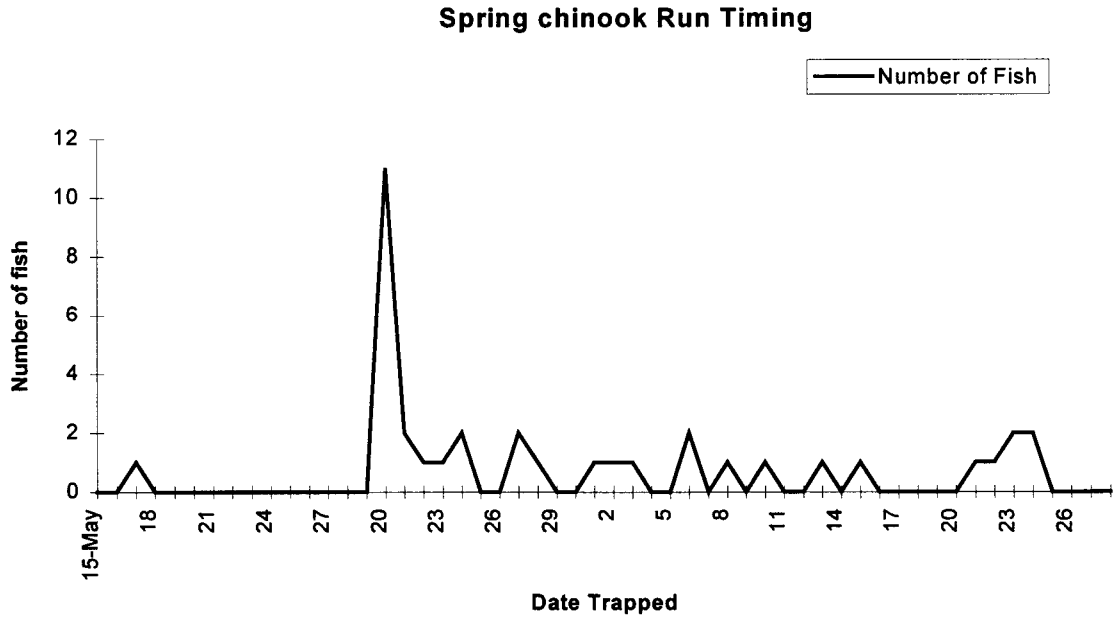
Appendix J. Steelhead run timing at Oxbow Hatchery, BY96.



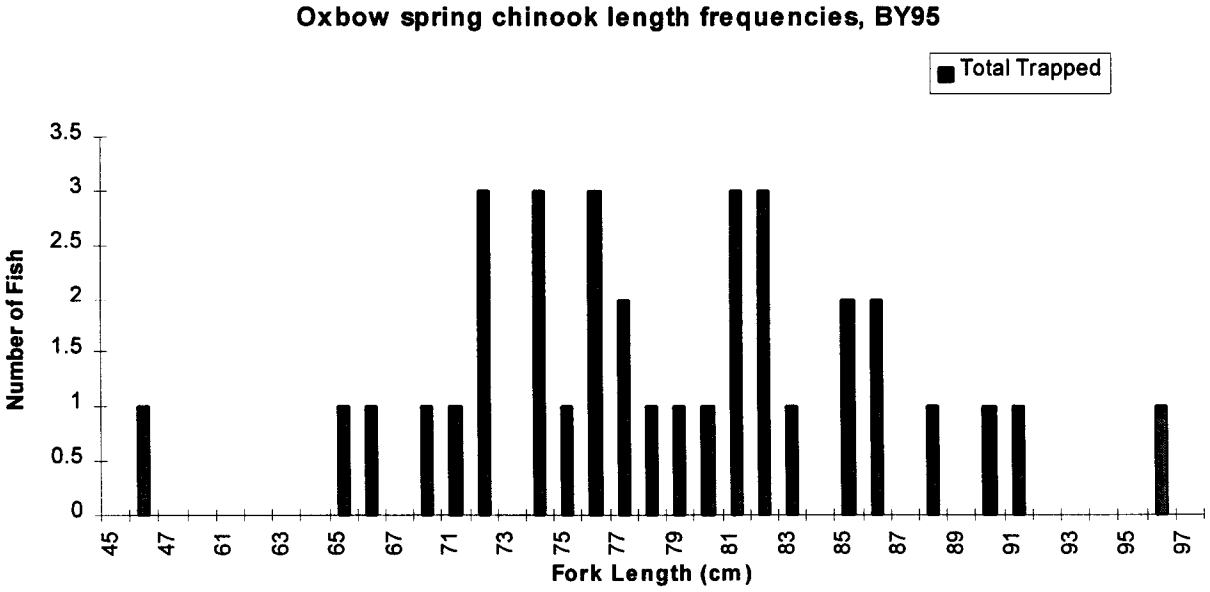
Appendix K. Oxbow steelhead length frequencies, BY96.



Appendix L. Spring Chinook run timing at Oxbow Hatchery, BY95.



Appendix M. Oxbow spring chinook length frequencies, BY95.



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